Cat. **64N07500**

Baxter

K-MOD* 100 Heat Therapy Pump Service Manual

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LISTED 304L

STANDARD (NORME) C22.2 NO. 125 RISK CLASS (CATEGORIE DE RISQUES) NO. 2G

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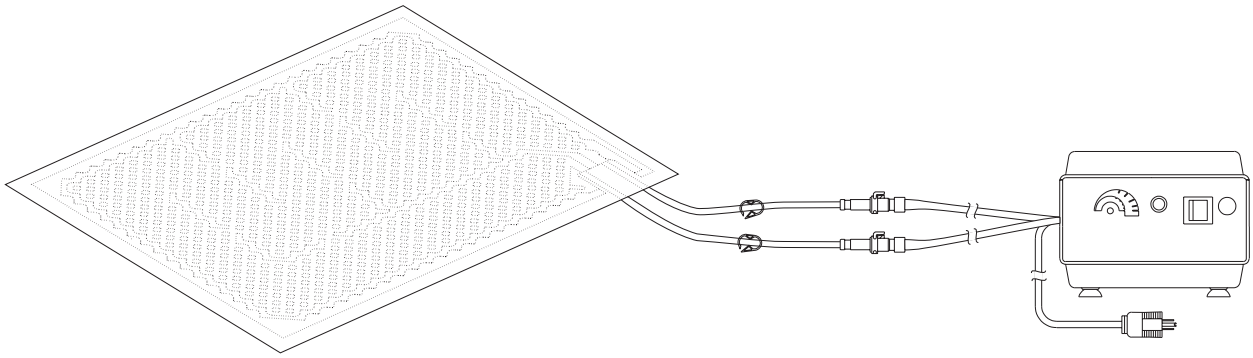

Figure 1 - K-MOD 100 Heat Therapy System

1.1 General

This technical manual provides service instructions for the K-MOD 100 heat therapy pump, distributed by Baxter Healthcare Corporation.

1.2 Description and Function

Heat therapy is effective in the dilation of blood vessels, thereby increasing the blood flow to the heated area. Heat therapy has a variety of uses, the most common being treatment of aches and pains in joints and muscles.

The Baxter K-MOD 100 heat therapy system, which consists of the K-MOD 100 pump and Duo-Therm* pad, provides a means of applying heat therapy by supplying temperature-controlled water through a connector hose to a Duo-Therm Pad. The hose is terminated in easy-to-use connectors.

The Duo-Therm Pad provides the interface for delivering the heat therapy. The pad is applied to the part of the body requiring heat therapy, and the circulating water maintains the pad at the set point temperature. The temperature set point is key-operated to prevent tampering.

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1.3 Warranty

The K-MOD 100 heat therapy pump is warranted against defects in material and workmanship under normal use and operation for a period of one (1) full year from the date of purchase.

This warranty is expressly in lieu of any other express or implied warranties, including any implied warranty of merchantability or fitness for purpose and of any other obligation on the part of Baxter Healthcare Corporation.

Parts Warranty

Defective parts will be exchanged free of charge where defects in materials and/or workmanship occur within 90 days from the date of delivery provided the parts are returned to Gaymar Industries, Inc. with prior authorization prepaid.

Refer all service or technical related questions to Gaymar Industries. Merchandise returned for repair to Gaymar must be accompanied by a Returned Goods Number (RG#) issued by Gaymar Industries, authorizing goods to be returned.

For Customer Service or Technical service, call or fax:

Phone: (716) 662-2551
1 800 828-7341

Fax: (716) 662-0748

Advise model, serial number, and nature of problem. You will be given a Return Goods Number (RG#). The serial number can be found on the back of the pump (see Fig. 2, page 4).

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2.1 Service/Operating Precautions

Read and understand this service manual and all precautions below prior to servicing the K-MOD 100 pump.

⚠ DANGER

- Risk of explosion. Do not use in the presence of flammable anesthetics.
- Risk of electric shock. Disconnect power before servicing the K-MOD 100 pump.

⚠ WARNING

- This device pumps warmed water through a pad. Set pad temperature only as prescribed by and under the guidance of a physician. Monitor the patient's temperature and skin condition every 20 minutes or as directed by a physician. Failure to adhere to these warnings could result in patient injury. The following Groups/ Conditions require additional surveillance:

Group/Condition at risk	Potential injury
Pediatric patients	Hyperthermia/ Hypothermia
Patients with impaired circulation	Ischemia
Areas of application are under pressure	Ischemia
In combination with topical solutions whose toxicity may be affected by the application of heat	Chemical Injury
In combination with other heat sources	Thermal Injury

- Only qualified medical service personnel should repair the K-MOD 100 pump. Improper repair may result in death or serious injury, equipment damage, or malfunction.

(continued next column)

⚠ WARNING

- Always perform the *FUNCTIONAL CHECK AND SAFETY INSPECTION* (pp. 10-13) after making repairs and before returning the pump to patient use. Document your findings on the *INSPECTION FORM* (p. 14). Improper repair may result in death or serious injury, equipment damage, or malfunction.

⚠ CAUTION

Do not perform any powered tests with the reservoir empty. Damage to the K-MOD 100 pump may result.

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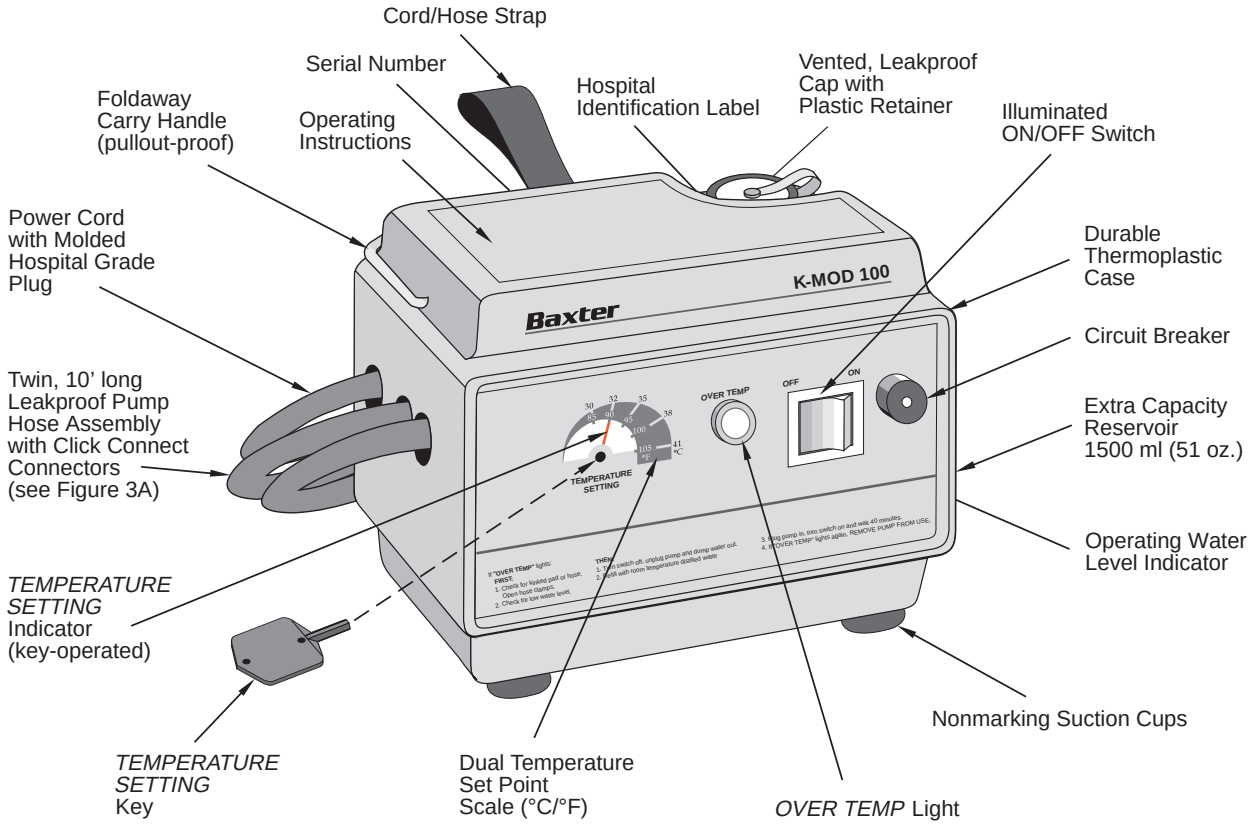

Figure 2 - K-MOD 100 Pump Features

3.1 Features

Attached Hose with Click Connect Connectors — 10-ft. dual adapter tubing. Connectors (see Fig. 3A) allow pads to be connected to pump.

Tip-over Switch — Turns heater off if pump is tipped. Note: This does not activate the *OVER TEMP* light.

Hospital ID Label — A label is provided on the back of the pump for your convenience. Use a felt tip or ball point pen to add any required hospital identification.

***OVER TEMP* Light** — Indicates the pump and heater have been turned off. This light is activated by the two *OVER TEMP* safety thermostats. Refer to the *TROUBLESHOOTING* section.

Circuit Breaker — When the circuit breaker trips, the small button in the center will extend $^1/_4$", exposing a white band. Refer to the *TROUBLESHOOTING* section.

***OVER TEMP* Safety Thermostats** — Either of two limit thermostats will shut off pump and heater if the high temperature limit is exceeded. The *OVER TEMP* light will glow. Refer to the *TROUBLESHOOTING* section.

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3.2 Connecting Pads

1. To Connect

- Attach the Duo-Therm pad to the K-MOD 100 pump using the connector tubing. Push the male end of the click connector into the female end of the connector on the dual adapter tubing. When you hear an audible "click," a secure connection of the couplings has been completed (Fig. 3A).

2. Pinch Clamps

- Open (Fig. 3B).
- Closed (Fig. 3C).

3. To Disconnect

- Press down on the thumb tab of the female coupling body and the parts will partially disconnect. Then pull the male end of the click connector out to complete the disconnection (Fig. 3D).

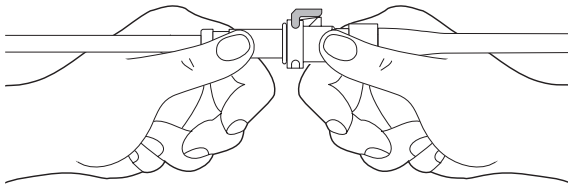

Figure 3A - Connecting Pads

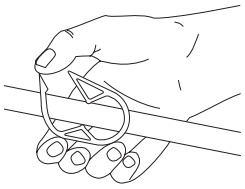

Figure 3B - Pinch Clamp (open)

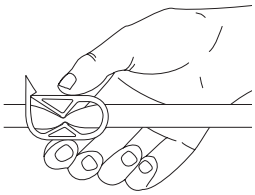

Figure 3C - Pinch Clamp (closed)

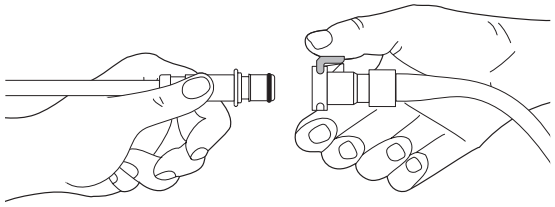

Figure 3D - Disconnecting Pads

3.3 Start-up Procedure

1. Before filling, always attach a Duo-Therm pad to the connector hose on the K-MOD 100 pump (Fig. 3A). Unkink pad and hose. Open the pad tubing pinch clamps (Fig. 3B).
2. Unscrew the fill cap on top of the pump. Fill the pump with room temperature (i.e., not hot) **distilled water** to the operating level indicated on the side of the pump. **NOTE: Using tap water will decrease the life of the pump.**
3. Insert temperature setting key. Set temperature as prescribed by the physician. Remove key to prevent tampering.
4. Plug pump into a properly grounded outlet.
5. Turn on the power switch. The selected water temperature will be reached in approximately 20 minutes.
6. If the water level drops below the operating level, add water.

   Do not overfill. Overfilling can result in reduced pump motor life.
7. Apply Duo-Therm pad to the patient. Follow pad instructions.
8. For specified performance, keep the pump at or above the level of the pad.
9. If the pump is placed below the pad, water will drain into the pump when it is shut off. If the pump has been overfilled, excess water can leak out onto the floor or cause reduced motor life.

3.4 Shutdown Procedure

1. Turn off pump before disconnecting the pad. To prevent water spillage, always disconnect pad from pump with connectors raised above the level of the pad and pump.
2. Press down firmly on the thumb tab of the pinch clamp until the flow of water ceases. Release your grip and the teeth will hold the clamp in the closed position (see Fig. 3C).
3. Disconnect the Duo-Therm pad from the dual adapter hose on the K-MOD 100 pump (see Fig. 3D).

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3.5 Storage

Short Term

Disconnect pad. Leave distilled water in the reservoir. To prevent hose kinks, coil the hose rather than folding it. Fasten the hose and cord with strap.

Long Term

With a pad connected, add 1/4 ounce AirKem A-33, available from Ecolabs, Inc., 370 Wabasha, St. Paul, MN 35102 (phone: 1 800 247-4362) or from Gaymar Industries, Inc., product catalog MTA-33, or equivalent to water already in reservoir. Run the K-MOD 100 pump for two (2) minutes. Turn off pump. Close pinch clamps and disconnect pad. Drain pump. To prevent hose kinks, coil the hose rather than folding it. Fasten the hose and cord with strap and store pump.

3.6 Draining

Disconnect the pump from AC power. Disconnect the pad. Remove the fill cap and invert the pump over a sink. When all fluid has drained from the hoses and reservoir, replace the fill cap.

3.7 Cleaning

Clean outer surfaces of the pump with:

- a damp cloth and soapy water,
- Fantastik** spray cleaner, or
- a mild abrasive such as Soft Scrub*** cleanser without bleach.

To clean the fluid system, prepare a germicidal solution according to the manufacturer's instructions. Drain the pump. Connect a pad. Fill the reservoir with the solution to the operating level indicated on the side of the pump. Set the temperature indicator to its lowest setting (fully counterclockwise), start the pump, and circulate the solution for one (1) hour. Drain the solution and refill the pump with distilled water. Disconnect pad. Using distilled water will not promote algae growth or mineral buildup.

Change the distilled water monthly or more often depending upon use.

3.8 Accessories

For best results use only Duo-Therm pads or reusable pads available from Baxter Healthcare Corporation. For a brochure listing the various Duo-Therm pads, contact Customer Service at 1 800 964-5227.

Duo-Therm Pads (single patient):

Accessories	Catalog No.
20" x 3" Neck Pad	S66N400CC
12" x 17" Flat Pad	S66N405CC
14" x 20" Flat Pad	S66N410CC
18" x 24" Flat Pad	S66N415CC
9" x 8" Special Use Arm/Ankle Pad	S66N441CC
9" x 17" Special Full Arm Pad	S66N442CC
12" x 14" Special Use Leg Pad	S66N443CC
14" x 12" Special Use Thigh Pad	S66N444CC

Reusable Pads

Accessories	Catalog No.
17" x 24" Reusable Pad	S66N110CC
12" x 15" Reusable Pad	S66N111CC
3" x 14" Reusable Pad	S66N112CC
5" x 8" x 16" Reusable Pad	S66N113CC

** Registered trademark of Dow Brands, Inc.
*** Registered trademark of The Clorox Company

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Dimensions

- Height ..... $6\frac{1}{4}$" (15.9cm)
- Width ..... $5\frac{5}{8}$" (14.3cm)
- Length ..... $8\frac{1}{8}$" (20.6cm)

Weight (empty) ..... 5 lbs, 2 oz. (2.3kg)

Accuracy ..... ±2°F (105°F)

Ambient Operating Temperatures ..... 60° to 90°F (15.6° to 32.2°C)

Storage Temperatures (empty) ..... -30° to 160°F (-34.4° to 71.1°C)

Temperature Set Point Range ..... 85° to 105°F (29.4° to 40.6°C)

Reservoir Capacity ..... 51 oz. (1500mL) maximum

Flow Rate ..... 9 gph (34L/hr.) minimum with pad attached

Power Cord ..... 18 AWG, 3 conductor, 9 ft. (274cm), Type SJT with molded, hospital grade plug

Circuit breaker ..... 3 amperes

1st Backup Limit Thermostat (manifold mounted) ..... Bimetallic (trip point fixed) 108° to 115°F (42.2° to 46.1°C)

2nd Backup Limit Thermostat (well mounted) ..... Bimetallic (trip point fixed) 108° to 122°F (42.2° to 50°C)

Current Leakage ..... 100 microamperes maximum

Ground Resistance ..... 0.5 ohm maximum

Electrical requirements ..... K-MOD 100 pump†

Voltage (VAC) 120
Frequency (Hz) 60
Current (amps) 1.8
Power req'd (watts) 200

† Tested to UL 544 and CSA C22.2, No. 125

SECTION 5 - THEORY OF OPERATION

5.1 Water Temperature Control

There are four devices that control or limit the operation of the heater in the K-MOD 100 pump:

- The temperature controller is thermistor controlled (Fig. 4, item 1, p. 9). This controller is adjustable over a temperature range of 85° to 105°F (29.4° to 40.6°C). The desired water temperature is set with a special removable key (Fig. 4, item 7). To prevent unauthorized temperature setting changes, remove the key after the temperature has been set.
- The manifold backup limit thermostat (Fig. 4, item 9) is mounted on the brass manifold block (Fig. 4, item 8). This thermostat senses water temperature flowing to the pad and will shut off the pump and heater and activate the *OVER TEMP* light if the water temperature exceeds specific limits. The purpose of the manifold backup limit thermostat is to prevent the pump from providing water at too high a temperature to the pad. The thermostat automatically resets after it has cooled to a temperature below its reset temperature.
- The well backup limit thermostat (Fig. 4, item 5) is mounted on the brass plate (Fig. 4, item 11) that extends along and under the heater (Fig. 4, item 4) near the bottom of the reservoir. This thermostat senses water temperature in the reservoir and will shut off the pump and heater and activate the *OVER TEMP* light if the reservoir temperature exceeds specific limits. The purpose of the well backup limit thermostat is to both prevent the pump from providing water at too high a temperature to the pad and to protect the pump from high temperature damage due to a low water level. The thermostat automatically resets after it has cooled to a temperature below its reset temperature.
- The tip-over switch (Fig. 4, item 2; see also Fig. 11, item 64, p. 25) is mounted on the PC board. This mercury-type switch will shut off the heater when the pump is tipped more than 45° from the vertical position.

  NOTE: The tip-over switch does not shut off the pump motor or activate the *OVER TEMP* light.

5.2 Fluid System

The pump (Fig. 4, item 12) is a sump configuration driven by an impedance protected, shaded pole AC motor (Fig. 4, item 6).

The return hose fitting (Fig. 4, item 10) is machined internally to act as an orifice. This maintains a back pressure in the pad to make it resistant to flow restrictions.

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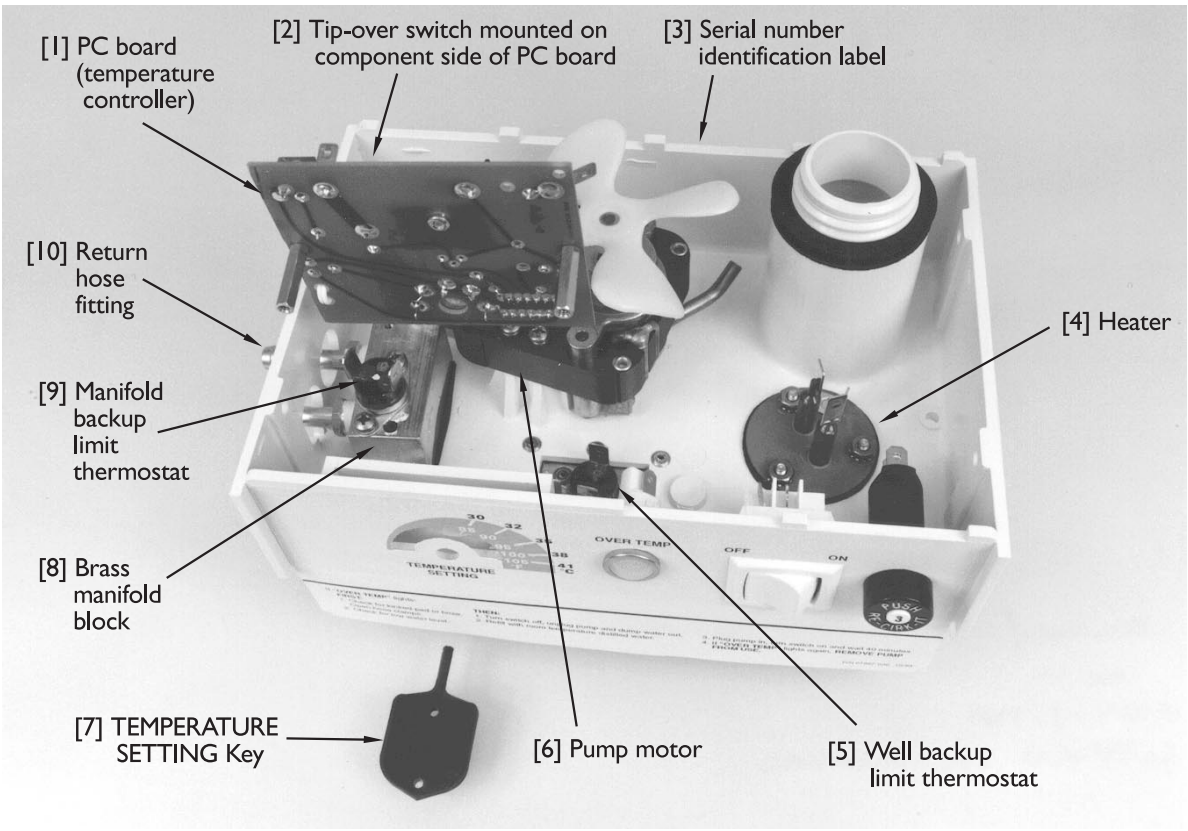

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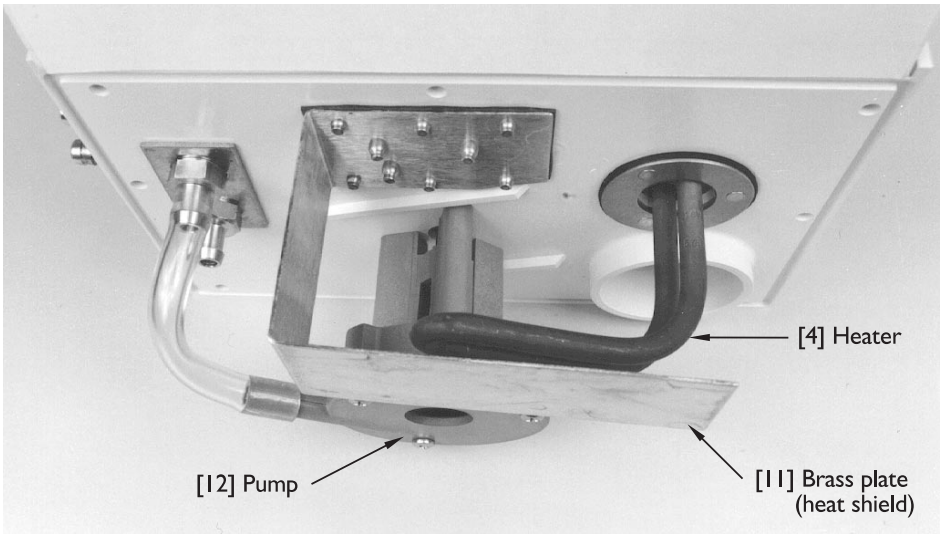

BOTTOM

Figure 4 - K-MOD 100 Pump Components

SECTION 6 - FUNCTIONAL CHECK & SAFETY INSPECTION

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Important

This section is designed to provide a complete check of all pump parameters. The order of tests should be followed so that the functional testing can be completed in the least possible time.

Follow these procedures carefully, paying particular attention to test setups. Any deviation from the setups, procedures, or test equipment may result in incorrect or misleading results.

Before making any repairs, be sure to recheck your test setup, procedure, and test equipment.

⚠ DANGER

Risk of electric shock. Disconnect power before servicing the K-MOD 100 pump.

⚠ WARNING

- Only qualified medical service personnel should repair the K-MOD 100 pump. Improper repair may result in death or serious injury, equipment damage, or malfunction.
- Always perform the *FUNCTIONAL CHECK AND SAFETY INSPECTION* (pp. 10-13) after making repairs and before returning the K-MOD 100 pump to patient use. Document your findings on the *INSPECTION FORM* (p. 14). Improper repair may result in death or serious injury, equipment damage, or malfunction.

⚠ CAUTION

Do not perform any powered tests with the reservoir empty.

Damage to the K-MOD 100 pump may result.

Interval

To assure the optimum performance, dependability and safety, the following should be performed every six (6) months or as specified in the facility's preventive maintenance program.

Required Tools

TPT-9 * ..... Flow and Temperature Tester

Adaptor Hose Assembly (P/N 77926-000) *

TFC-1 * ..... Thermometer, 30°F to 125°F (-2°C to 52°C), 1°C accuracy, 12" long, 3" immersion (e.g., Brooklyn Thermometer #73544 or equivalent, Brooklyn Thermometer Co., Farmingdale, NY 11735)

Duo-Therm Pad ... 14" x 20" Flat Pad (S66N410CC)

TPC-1 * ..... Test Cover

Ground Resistance Tester

Current Leakage Meter

Distilled Water..... 2 liters (approximate)

Synthetic Oil ..... Anderol #465 * (P/N 77137-000)

INSPECTION FORM (see page 14)

* Available from Gaymar Industries, Orchard Park, NY, 1 800 828-7341

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6.1 Physical Condition Check

1. Examine the line cord along its entire length for physical damage, such as cuts or cracked insulation. A damaged line cord should be replaced rather than repaired. Check the quality of the strain reliefs at both ends of the line cord.
2. Examine the plug on the line cord to be sure it is in good condition. If unit has non-molded type plug, open plug and check for wire breakage and loose terminal screw(s). If defective, replace with a hospital grade plug. Torque terminal screw(s) and outside housing screws to 12 in.-lbs.
3. Operate switches and control settings at all positions. If defective, replace.
4. Check circuit breaker. To check circuit breaker, turn K-MOD 100 pump on for five (5) seconds. The ON/OFF switch will light (amber) if the circuit breaker is functioning properly.
5. Visually inspect pump. Check for cracked or damaged plastic parts. **Be sure unit is unplugged.** Remove fill cap. Remove four (4) screws holding cover and remove cover. (Be sure not to lose fill neck gasket.) Perform visual inspection of all internal parts. Remove any accumulated dirt with a vacuum cleaner. Leave cover off for balance of inspection.

6.2 Motor Lubrication

1. Oil the pump motor every 6 months with Anderol #465 (P/N 77137-000) or equivalent to extend the life of the K-MOD 100 motor. Anderol #465 is a synthetic oil. Do not use a petroleum-based oil since it will leave a residue as it breaks down, causing the motor to seize. The motor has a special oiler tube attached to the lower motor bearing. Apply four (4) drops of oil directly into the tube. Also add four (4) drops of oil to the vent hole in the bearing housing of the motor located below the fan. See figure 5.

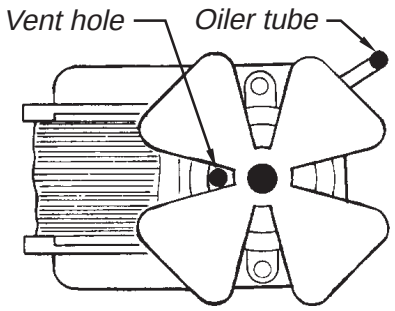

Figure 5 - TOP VIEW OF PUMP MOTOR

6.3 TPC-1 Test Cover Installation

1. Connect TPC-1 test cover (Fig. 6, p. 20 and Fig. 9, p. 23). Always match the color of TPC-1 wiring connections to the color of K-MOD 100 wiring. Be sure to keep wires away from fan. Install test cover. Be sure to push cover on tightly. It is not necessary to install screws.
2. Connect pump with test cover, pad, adaptor hose assembly, and TPT-9 flow/temperature tester (Fig. 7, p. 21). Be sure the TPT-9 is connected to the supply side of the K-MOD 100 pump.
3. Fill unit with room temperature distilled water and replace fill cap. Place pad on an insulating material (e.g., cloth or towel).
4. Set both test cover switches to the *OPEN* position.

6.4 Ground Resistance Check

⚠ DANGER

Risk of electric shock. Be sure pump is unplugged when performing ground resistance test.

1. Use a ground resistance meter to measure the resistance between the ground pin on the plug (Fig. 10, item 44 or 49, p. 24) and the brass manifold block (Fig. 10, item 47). Contact is available through the hole where the hoses connect to the pump. This value should not be more than 0.5 ohm.

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6.5 Current Leakage Check

It will be convenient to check current leakage at this point since the unit is full and connected to a pad.

1. Measure the maximum current leakage for all combinations of power switch *ON* or *OFF*, heater *ON* or *OFF*, polarity *NORMAL* or *REVERSED*, and ground *OPEN* or *CLOSED*. Access to chassis ground for current leakage testing is available through the hole where the hose connects to the pump. The highest reading is typically less than 30 μA. The maximum allowable reading is 100 μA. Record the highest reading.
2. Disconnect leakage meter setup.

6.6 Tip-over Switch Check

1. Check the tip-over switch at this point, since the test cover is on and the unit is full. Turn on pump. Set temperature to maximum (105°F) on dial. The heater indicator (Fig. 6, p. 20) will be on. Tip the unit approximately 45°. If the heater indicator goes out, the tip-over switch is operating. If not, repair or replace the PC board (p. 16). Record results.

6.7 Flow Rate Test

1. Be sure the pad is flat and warm (approximately 105°F) and at the same level as the pump. Top of TPT-9 float (see Fig. 7, p. 21) should read at least 9 gph. Record reading.

   NOTE: If flow is below 9 gph, refer to *TROUBLESHOOTING* section (pp. 18-19).

6.8 Operating Temperature Test

1. Make sure temperature is set to maximum (105°F) on dial. Allow unit to come to a steady temperature, approximately thirty (30) minutes.
2. To ensure accurate temperature readings, add a small amount of water to TPT-9 well. Insert thermometer in TPT-9 well.
3. Take readings every thirty (30) seconds for five (5) minutes for a total of ten (10) readings. The average of these readings should be 105°F ±2°F. The bandwidth should not exceed 2°F. Bandwidth is the difference between the maximum and minimum temperature excursions. Record the average value. If the unit is out of calibration, refer to the *CALIBRATION* section (p. 17).
4. **Do not let the pump cool down.** Proceed directly to *Backup Limit Thermostat Test.*

6.9 Backup Limit Thermostat Test

1. With the pump operating properly at 105°F ±2°F, move the primary shorting switch to the *SHORT* position (Fig. 6, p. 20). This will short out the temperature controller and allow the pump to continue heating to the trip point of the backup limit thermostat(s).
2. Carefully observe the rising temperature and record the highest reading. When a thermostat opens, the pump will turn off, the *OVER TEMP* light will be lit, and the *HEATER INDICATOR* light on the test cover will turn off. (If the *OVER TEMP* light does not light and a thermostat has tripped, replace the light.) Either the *MANIFOLD* or *WELL* light on the test cover will be lit or both lights will be off, depending on which thermostats have tripped.
   - If the manifold thermostat light is on, then the manifold thermostat has opened. The temperature recorded must be between 108° to 115°F (42.2° to 46.1°C). **If the thermostat operates outside its intended range, it must be replaced (see page 16).** Proceed to step 3.
   - If the well thermostat light is on, then the well thermostat has opened. The temperature recorded must be between 108° to 122°F (42.2° to 50°C). **If the thermostat operates outside its intended range, it must be replaced (see page 16).** Proceed to step 3.
   - If neither light is on, then both thermostats have opened at the same temperature. To confirm this, toggle the thermostat shorting switch to the *MANIFOLD* position. (The *WELL* light should be on.) Next, toggle switch to the *WELL* position. (The *MANIFOLD* light should be on.) **If either thermostat opens outside its intended range as defined above, it must be replaced (see page 16).** Proceed to step 4.
3. To test the remaining thermostat, toggle the limit thermostat shorting switch to the position corresponding to the non-tripped thermostat. (This will short out the previously opened thermostat and allow the unit to continue heating.) Both thermostat indicator lights should be off and the *HEATER INDICATOR* light should be on. Carefully observe the rising temperature and record the highest reading.

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When the water temperature rises to the trip point of the remaining thermostat, the *OVER TEMP* light will be on, the pump will turn off, the *HEATER INDICATOR* light will turn off, and the appropriate thermostat light will be on.

- If the manifold thermostat light is on, then the manifold thermostat has opened. The temperature recorded must be between 108° to 115°F (42.2° to 46.1°C). **If the thermostat operates outside its intended range, it must be replaced (see page 16).**
- If the well thermostat light is on, then the well thermostat has opened. The temperature recorded must be between 108° to 122°F (42.2° to 50°C). **If the thermostat operates outside its intended range, it must be replaced (see page 16).**

4. Unplug the unit, remove the test cover and proceed to *LEAK TEST.*

6.10 Leak Test

1. Immediately upon completion of Backup Limit Thermostat Test, reinstall fill cap tightly. Put your finger over the hole in the cap and tilt unit toward you so the front is down. Hold for three (3) minutes.
2. Return the unit to upright position and carefully check inside of tray and reservoir-to-tray joint for leaks. Repeat process turning pump on back face. If leakage is found, refer to the *DISASSEMBLY/ REASSEMBLY* section (pp. 15-16), and correct problem.

6.11 Cover and Fill Neck Gasket Reinstallation

When reinstalling cover, be sure the fill neck gasket (Fig. 10, item 6, p. 24) is in place. Push cover down as tightly as possible. Hold in place when tightening cover screws.

6.12 Completing the Functional Check

This completes the *FUNCTIONAL CHECK* procedure. Return pump to service if it is operating properly, or proceed to the *TROUBLESHOOTING GUIDE* section (pp. 18-19) pertaining to the problem(s).

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6.13 Inspection Form

Inspection forms vary from hospital to hospital. The following sample form is intended as a guide so that the important parameters are recorded.

K-MOD 100 Pump Functional Check and Safety Inspection Form

Date _____

Model Number _____ Serial Number _____

	Item	Value	OK?	Action Needed	Action Taken
			(check one)		
6.1	Inspect physical condition (line cord, plug, housing)				
	Inspect electrical compartment (switches, fuse/circuit breaker)				
	Inspect hose connections, Click Connect connectors				
6.2	Lubricate motor				
6.3	Connect TPC-1 test cover; match wire colors of connections				
6.4	Measure ground resistance; <0.5 ohm . . . indicate value				
6.5	Measure current leakage; <100 μA . . . indicate highest value				
6.6	Check tip-over switch				
6.7	Measure flow; > 9 gph (34L/hr.) . . . indicate value				
6.8	Measure operating temperature @ 105°F ± 2°F . . . indicate average				
6.9	Record manifold backup limit thermostat trip point; 108°F to 115°F (42.2°C to 46.1°C) . . . indicate value				
	Record well backup limit thermostat trip point; 108° to 122°F (42.2° to 50°C) . . . indicate value				
	"OVER TEMP" light operates				
6.10.	Check for leakage				
6.11	Reinstall cover and the fill neck gasket				

Signature _____

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Important

⚠ DANGER

Risk of electric shock. Disconnect power before servicing the K-MOD 100 pump.

⚠ WARNING

- Only qualified medical service personnel should repair the K-MOD 100 pump. Improper repair may result in death or serious injury, equipment damage, or malfunction.
- Always perform the *FUNCTIONAL CHECK AND SAFETY INSPECTION* (pp. 10-13) after making repairs and before returning the K-MOD 100 pump to patient use. Document your findings on the *INSPECTION FORM* (p. 14). Improper repair may result in death or serious injury, equipment damage, or malfunction.

⚠ CAUTION

Do not perform any powered tests with the reservoir empty. Damage to the K-MOD 100 pump may result.

NOTE: All wires are terminated with slip-on connectors. When text says "remove wire," the slip-on connector is to be removed from the mating lug on the specific item.

7.1 Cover

1. Unscrew fill cap/valve assembly (Fig. 10, item 1, p. 24) and remove. Unscrew plastic retainer.
2. Remove the four screws which retain the cover, two on each end of the pump.

   NOTE: When reinstalling the cover, do not forget to replace the fill neck gasket (Fig. 10, item 6).

7.2 Motor

1. Place a screwdriver under fan hub (Fig. 10, item 7, p. 24) and twist to remove fan.

   NOTE: When replacing the fan, make sure the hub is flush with top of motor shaft.
2. Remove green ground wire and orange and blue power wires.

   NOTE: To prevent breaking the motor lugs, support them when removing the slip-on connector.
3. Remove the four retaining screws and washers on the top face of the motor.
4. It is necessary to remove the reservoir to remove the motor. Remove the eight (8) screws located around the inside wall of the tray.
   NOTE: It is not necessary to remove the front label (Fig. 10, item 37). The front label is attached only to the tray and will slip off the reservoir.
5. Gently separate the reservoir from the tray. Do not damage the large O ring that seals the tray and reservoir.
6. Turn the tray on its backside (front label up). Place a screwdriver against the white impeller in the bottom of the pump housing to prevent the impeller from turning and remove the screw retaining the impeller. It is not necessary to remove the bottom housing (Fig. 10, item 24) of the pump.
7. The impeller may now be slipped off the shaft. Return the tray assembly to an upright position. The motor may be removed by lifting straight up.
8. Center the new motor seal gasket over opening and insert new motor through seal. Replace impeller onto shaft and secure motor.
9. Do not overtorque the four (4) motor mounting screws. Torque value is 6 to 8 in.-lbs.
10. If tray inserts are loose or motor mounts are worn, a new tray with sensor bracket should be installed.

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7.3 Heater

1. Remove the ground wire (green) and the two (2) heater wires (red and blue). NOTE: On reassembly, the red wire goes on to the front post of the heater.
2. Remove the three (3) nuts retaining the heater. The screws are retained in the tray. The heater can then be removed by raising and tilting the top of the heater toward the left side of the K-MOD 100 pump.
3. Reassembly is the reverse of the above.
4. Do not forget to install heater gasket (Fig. 10, item 11, p. 24).

7.4 PC Board

1. Using the plastic key (Fig. 4, item 7, p. 9), turn the temperature indicator to the eleven o'clock position. The slotted coupling should then be positioned with the slot opening up.
2. Cut the plastic tie holding the wire bundle to the PC board. Remove the red, orange, and blue wires from the PC board.
3. Remove the two screws (Fig. 10, items 56 & 57, p. 24) retaining the PC board. The board can then be raised from the tray, exposing the thermistor probe assembly in the brass manifold block (Fig. 10, item 47). Use caution to be sure no strain is put on thermistor leads (fine white wires).
4. Carefully remove the thermistor capsule from the manifold. To avoid damaging the thermistor, do not pull on the wires. A dental pick or scribe can be used to pry the capsule out of the hole.
5. On reassembly, put a small quantity of silicone heat sink compound (Dow Corning #340 or equivalent) around the thermistor capsule. Carefully insert the thermistor capsule into the hole on the brass manifold block. To avoid damaging the thermistor, do not push on the wires. The capsule may be seated by placing needle nose pliers or tweezers on the edge of the capsule.
6. The remainder of the reassembly is the reverse of the above. Upon inserting the PC Board, the potentiometer shaft (Fig. 10, item 52, p. 24) must be in the vertical position to mate with the slot in the temperature indicator (Fig. 10, item 40). Refer to *CALIBRATION* procedures (pp. 17-18).

7.5 Manifold Backup Limit Thermostat

1. Remove the two (2) wire lugs. Note the position of the color coded wires. Facing the front of the K-MOD 100 pump, the purple wire goes on the left hand lug, and the orange wire goes on the right hand lug.
2. Remove the two (2) screws retaining the thermostat to the brass manifold block.
3. Reassembly is the reverse of the above.
4. Always be sure to check the backup limit thermostats according to the *FUNCTIONAL CHECK & SAFETY INSPECTION* (pp. 12-13).

7.6 Well Backup Limit Thermostat

NOTE:

Do not attempt to replace the well thermostat. To insure proper operation of this thermostat, it is riveted and sealed to the tray assembly. Experience has proven that it cannot be successfully replaced. **If this item is defective, replace the entire tray assembly (Fig. 10, item 17, p. 24).**

7.7 Tray

1. Remove the eight (8) screws (Fig. 10, item 15, p. 24) around the inside wall of the tray. Gently pry the reservoir from the tray.
2. Remove all components including seal, bushing, and clips from the old tray and reinstall into the new tray assembly.
3. Attach the reservoir to the tray. Check that the reservoir ring seal (Fig. 10, item 19) is properly located in the groove in the tray. Install the eight (8) screws torqued to approximately 6 in.-lbs.
4. Always be sure to check the backup limit thermostats according to the *FUNCTIONAL CHECK & SAFETY INSPECTION* (pp. 12-13).

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Important

⚠ DANGER

Risk of electric shock. Disconnect power before servicing the K-MOD 100 pump.

⚠ WARNING

- Only qualified medical service personnel should repair the K-MOD 100 pump. Improper repair may result in death or serious injury, equipment damage, or malfunction.
- Always perform the *FUNCTIONAL CHECK AND SAFETY INSPECTION* (pp. 10-13) after making repairs and before returning the K-MOD 100 pump to patient use. Document your findings on the *INSPECTION FORM* (p. 14). Improper repair may result in death or serious injury, equipment damage, or malfunction.

⚠ CAUTION

Do not perform any powered tests with the reservoir empty. Damage to the K-MOD 100 pump may result.

8.1 Calibration Equipment

TPT-9 * .....Flow and Temperature Tester

TFC-1 * .....Thermometer, 30° to 125°F (-2° to 52°C), 1°C accuracy, 12" long, 3" immersion (e.g., Brooklyn Thermometer #73544 or equivalent, Brooklyn Thermometer Co., Farmingdale, NY 11735)

TPC-1 * .....Test Cover

Duo-Therm Pad .....14" x 20" Flat Pad (S66N410CC)

Adaptor Hose Assembly * (P/N 77926-000)

Insulated alignment tool

* Available from Gaymar Industries, Orchard Park, NY, 1 800 828-7341

8.2 Calibration

The calibration should be performed in a temperature controlled room, between 70°F and 75°F.

1. Remove the pump cover by removing the two (2) screws at each end of the pump. The fill cap/valve assembly can be removed by unscrewing the cap and plastic retainer. The cover is now free to be removed.
2. Carefully remove the seal from the R3 trim pot (Fig. 11, item 63, p. 25), located at the top right corner of the printed circuit board.
3. Install test cover. See *FUNCTIONAL CHECK & SAFETY INSPECTION* (p. 11) and figure 6.
4. Connect pump, pad, and TPT-9 Tester according to figure 7, page 21.
5. Fill pump with room temperature distilled water.
6. Set Temp Dial to 105°F (maximum).

   NOTE: Be sure the temperature dial is always set to the maximum clockwise position when making calibration measurements and adjustments.

7. The primary shorting switch (Fig. 6, p. 20) on the test cover must be in the *OPEN* position. The backup limit thermostat shorting switch (Fig. 6) must be in the *OPEN* position.
8. Turn unit on and allow to come to a steady temperature, approximately thirty (30) minutes.

   The *HEATER INDICATOR* on the cover should be on whenever the heater is on.

   NOTE: Flow must be 9 gph, minimum. If not, refer to the *TROUBLESHOOTING GUIDE* (pp. 18-19).

9. Start recording the temperature readings every thirty (30) seconds for five (5) minutes for a total of ten (10) readings. The average of these readings should be 105°F ±2°F. If not, it will be necessary to adjust the R3 trim pot (Fig. 6, p. 20). This is accomplished by inserting an insulated alignment

SECTION 8 - CALIBRATION

tool through the small hole in the left side of the TPC-1 test cover. Turn the potentiometer screw clockwise to increase the water temperature. Turn the screw counterclockwise to decrease the water temperature.

Do not force the adjusting screw past its stops.

10. After the final adjustment is made, let the unit run for one-half hour and recheck the calibration as described in step 9. The bandwidth should not exceed 2°F. Bandwidth is the difference between the maximum and minimum temperature excursions. If the *OVER TEMP* light is activated during the calibration adjustment, the water must be replaced with water 75°F or less and the calibration procedure repeated.
11. Without letting the pump cool, proceed directly to the Backup Limit Thermostat Test as outlined in the *FUNCTIONAL CHECK & SAFETY INSPECTION* (pp. 12-13). Record all results when recalibrating.

    Apply a calibration seal after the trim pot has been adjusted properly.

SECTION 9 - TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy
OVER TEMP Light	1. Pad or hose is kinked. Pinch clamps are closed. 2. Water level is low, or reservoir is empty. 3. Pump is filled with water that is too hot (it must be below 75°F).	Turn switch off, unplug pump, and dump water out. Unkink pad or hose. Open pinch clamps. Refill with room temperature distilled water to proper level. Plug pump in, turn switch on, and wait a minimum of 30 minutes.
	4. One of the backup limit thermostats has opened.	Unplug pump and install a test cover. Determine which thermostat has opened. Refer to *Backup Limit Thermostat Test* (pp. 12-13). Replace thermostat (p. 16).
	5. PC board (temperature controller) has failed.	Unplug pump, install test cover, and perform *Calibration* (pp. 17-18). Replace PC board as required (p. 16).
	6. Motor failed.	Replace motor.
Pump will not pump.	1. Water level is low, or reservoir is empty.	Refill with room temperature distilled water to proper level.
	2. *OVER TEMP* light is on.	Refer to *OVER TEMP* section above.
Pump will not turn on.	1. The *ON* switch may not be fully engaged.	The light on the switch should be lit. Verify that the switch is fully engaged in the *ON* position.
	2. The electrical cord is not plugged into a grounded electrical receptacle.	Insert the plug fully into the receptacle.

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Problem	Possible Cause	Remedy
Pump will not turn on. *(continued)*	3. The circuit breaker has tripped.	If the circuit breaker has tripped, turn the power switch to *OFF*. Wait two (2) minutes. Press the circuit breaker in. Turn pump on. If the circuit breaker trips again, unplug pump and remove pump from use. Determine cause. Reset breaker.
	4. Damaged cord or plug, or break in continuity between cord and breaker.	Check plug temrinals. Check power cord continuity to breaker. NOTE: Flex cord while checking continuity. Replace power cord assembly as required.
Pump will not heat.	1. Pump is tipped.	Place pump on level surface.
	2. Heater is not receiving power, or is defective.	Check if set point has been set too low. Remove cover and check power to heater. If power is present, heater is probably defective. Cold heater resistance is approximately 80 ohms. Replace if required. If there is no power at heater terminals, replace PC board.
Pump pumps OK, but *ON*/*OFF* switch pilot light does not light.	1. *ON*/*OFF* switch deffective.	Replace *ON*/*OFF* switch. NOTE: Neon pilot light is not replaceable.
Flow rate is less than 9 gph.	1. Flow path is restricted or obstructed.	Be sure pump is at same level as pad, pad is flat, and water temperature is 105°F. (Flow is specified under these conditions.) Look for obstructions in the flow path. Open hose clamps. The orifice in the return hose fitting (fig. 4, item 10, p. 9) is the smallest hole.
	2. Motor is malfunctioning.	Replace motor.
Current leakage is too high.	1. Heater will be the most probable cause.	Disconnect heater and check again. Replace heater if necessary. If current leakage remains high, continue disconnecting components until fault is located.
Resistance to ground failure (greater than 0.5 ohm)	1. Power cord or plug connection(s) will be the most probable cause.	Check that connections are tight (applies to older style [non-molded type] plugs.) Measure resistance of power cord alone. Replace if necessary. If problem persists, check grounding wire to each component for continuity.
Water leaks from Click Connect connector.	1. The couplings have not been securely connected.	The pump must always be connected to a Duo-Therm pad. If the connector leaks, push the male end of the click connector into the female end of the connector on the dual adapter tubing. When you hear an audible “click,” a secure connection of the couplings has been completed.
	2. Connector defective.	Replace connector.

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Figure 6 - TPC-1 TEST COVER

⚠ CAUTION

Route TPC-1 wires as shown to avoid interference with K-MOD 100 fan motor.

NOTE: Always match color of TPC-1 wiring connections to color of K-MOD 100 wiring.

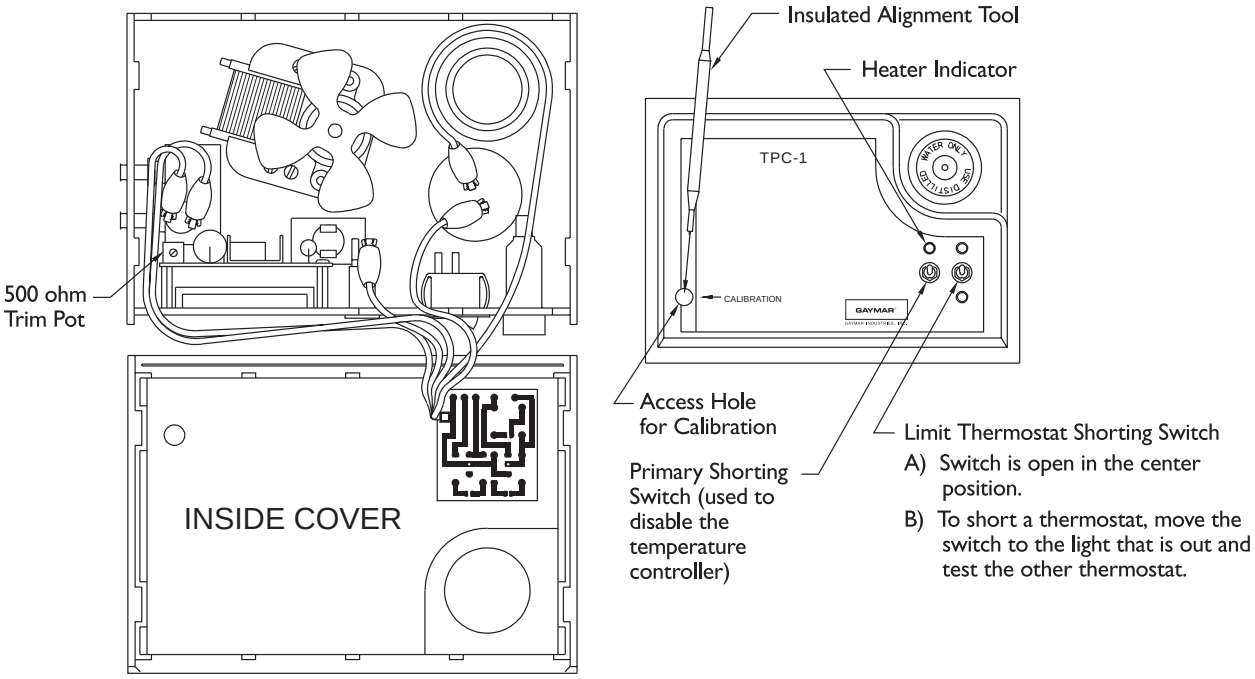

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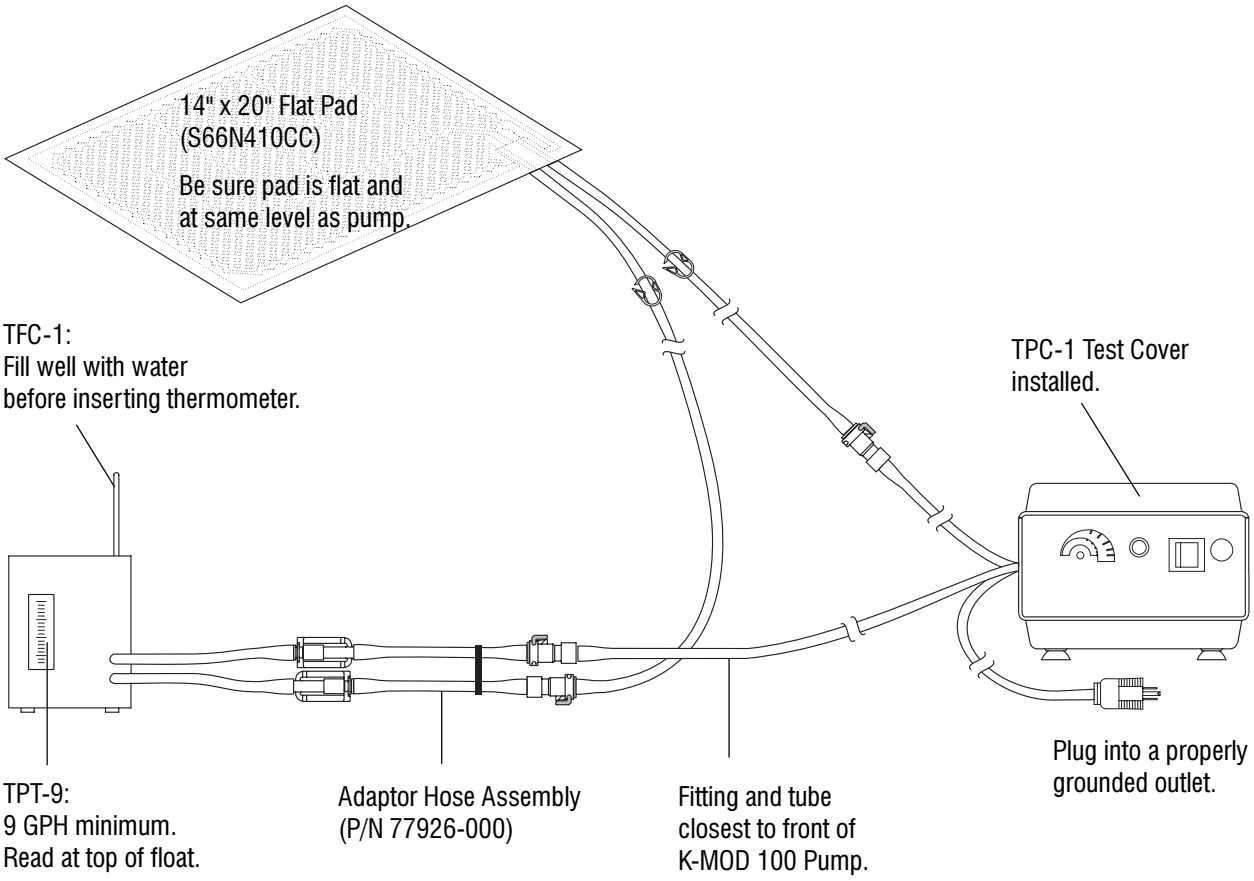
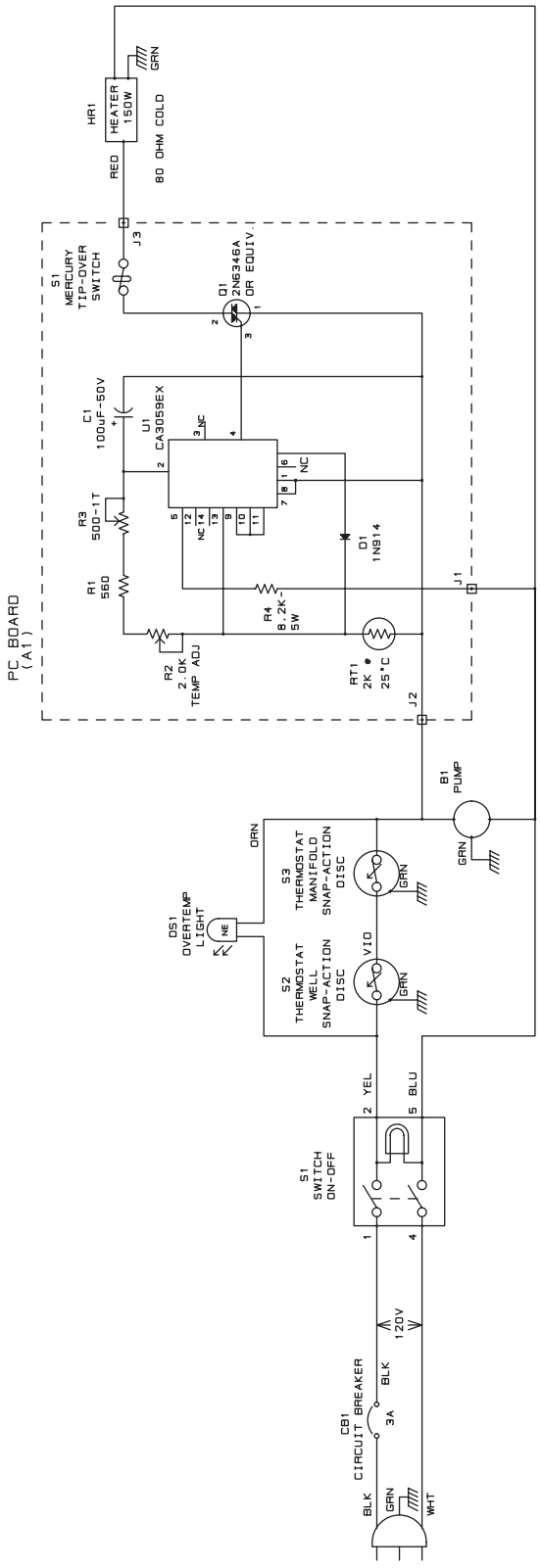
Figure 7 - FUNCTIONAL CHECK TEST DIAGRAM



NOTE:
If the flow meter is connected in reverse, the flow meter will indicate no flow. Reverse the **pump** hose connections to change the direction of flow.

Figure 8 - CIRCUIT DIAGRAM FOR K-MOD 100 PUMP



NOTES:

1. ALL RESISTANCES ARE IN OHMS.
2. ALL RESISTORS ARE 5% CARBON UNLESS NOTED.
3. ALL CAPACITORS ARE IN MICROFARADS UNLESS NOTED.
4. REFERENCE: THIS DRAWING CORRELATES TO DRAWING (C)08646 REVISION: NONE.
5. CAUTION: THE ACTUAL ASSEMBLIES ARE SUSCEPTIBLE TO DAMAGE FROM ELECTROSTATIC DISCHARGE. HANDLING OF THIS PRODUCT SHALL BE ACCOMPLISHED ONLY WITH ADEQUATE PROVISION TO PREVENT ELECTROSTATIC DISCHARGE DAMAGE.

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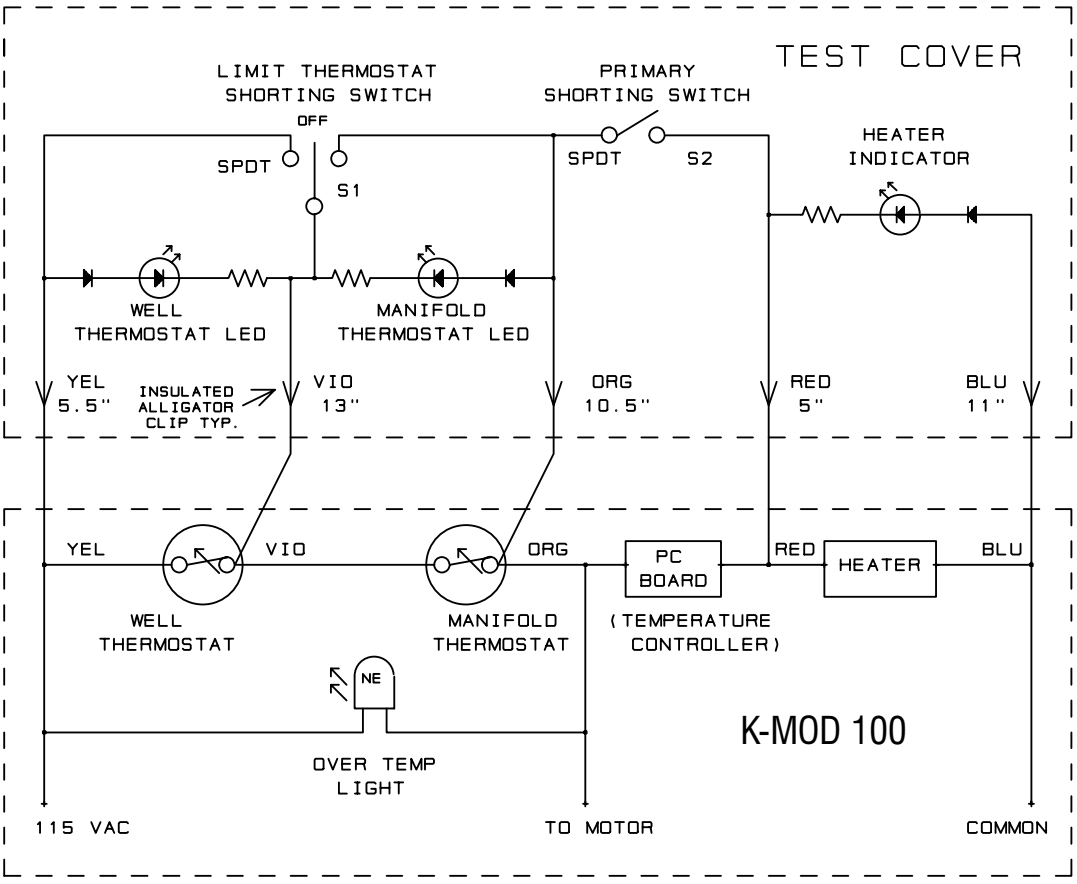
Figure 9 - CIRCUIT DIAGRAM FOR TPC-1 TEST COVER
(P/N 06520-000; to connect, refer to figure 6)



SECTION 13 - EXPLODED VIEW

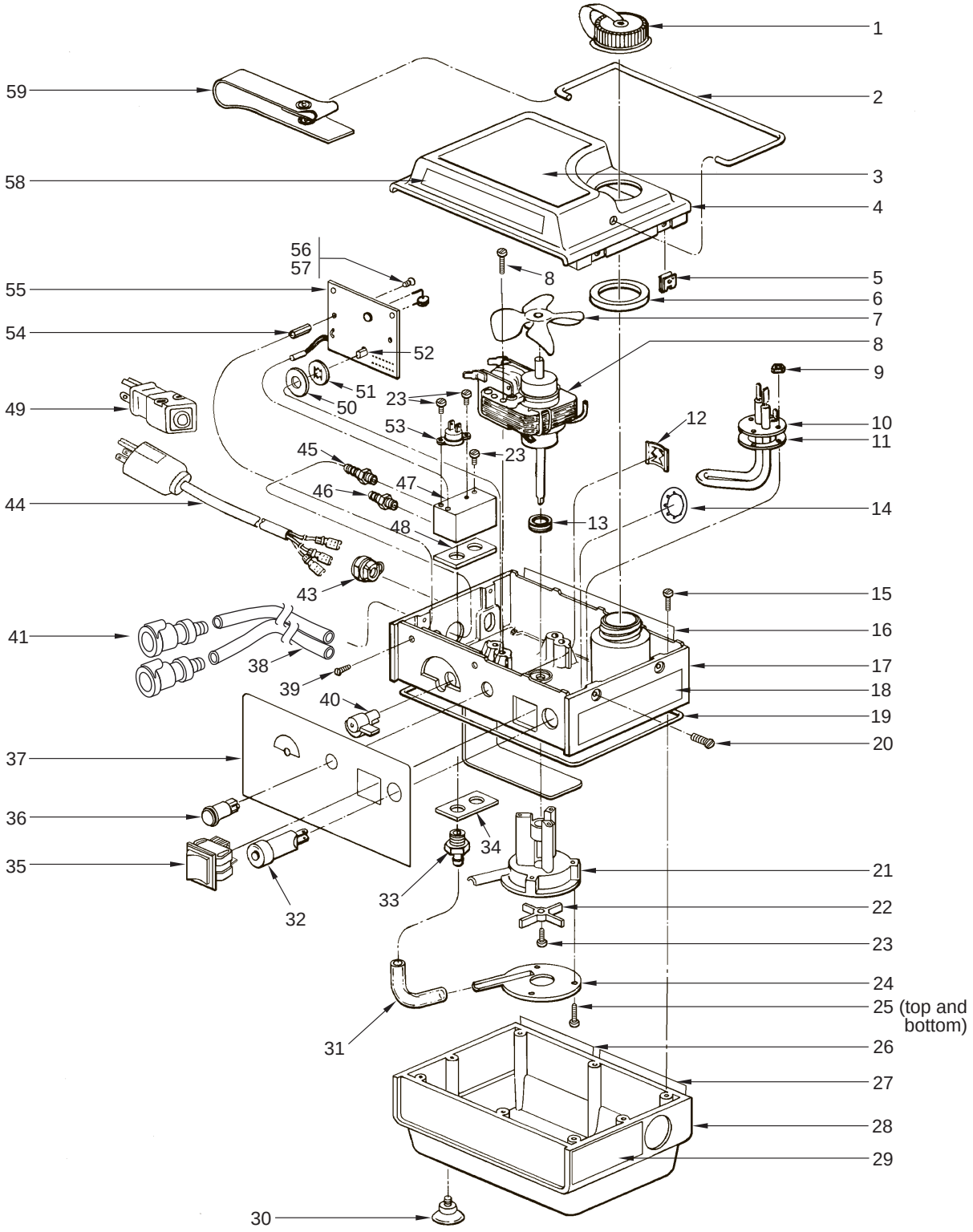


Figure 10 - EXPLODED VIEW

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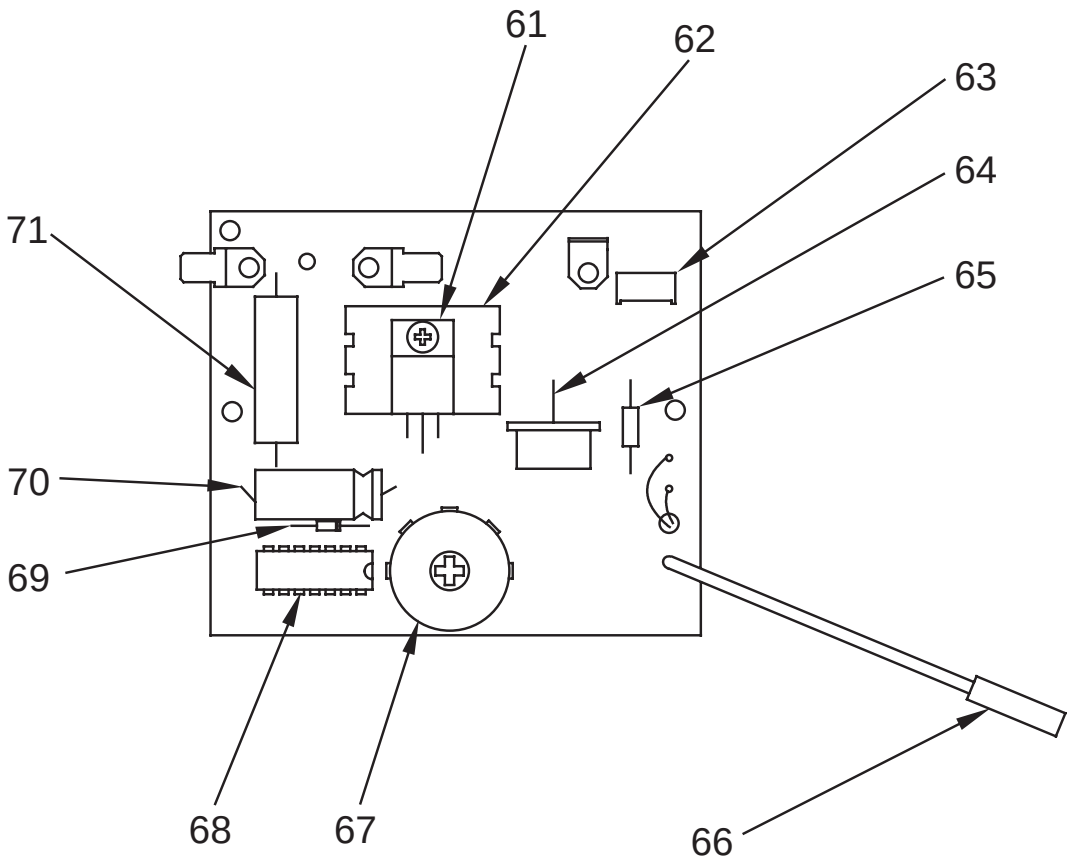

Figure 11 - PC BOARD

SECTION 15 - REPLACEMENT PARTS

Item	Qty	Description	P/N
1	1	Cap/Valve Assembly	04553-001
2	1	Handle (Replacement Kit) [Included with item 4]	77875-000
3	1	Instruction Label [Included with item 4]	08632-000
4	1	Cover Assembly [includes items 2, 3, 58, and 59]	08647-000
5	4	Fastener Clip [Included with item 4]	90085-033
6	1	Fill Gasket	03650-000
7	1	Fan	04152-000
8	1	Motor Kit [includes item 13]	77121-000
9	3	Nut, 6-32 SST	91190-002
10	1	Heater (120V)	04013-000
11	2	Heater Gasket	05069-000
12	1	OVER TEMP Light Clip	90085-003
13	1	Motor Seal Gasket [included with item 8]	04877-000
14	1	Circuit Breaker Clip	90085-041
15	8	Screw, 6-20 x 5/8", type B, SST	91272-011
16	1	ID and Ratings Label [included with item 17]	08633-000
17	1	Tray w/ Sensor Brkt, Thermostat* [includes item 16,18]	77941-000
18	1	Warning/Caution Label [included with item 17]	08242-000
19	1	Reservoir Seal	07968-000
20	4	Screw, 6-32 x 1/2", SST	90018-061
21	1	Pump Housing	03567-000
22	1	Impeller	03611-000
23	4	Screw, 6-32 x 1/4", SST	90018-057
24	1	Bottom Housing	03568-000
25	6	Screw, 6-20 x 5/8", type BT, SST	90514-011
26	1	Serial Number Label [included with item 28] (NOT AVAILABLE SEPARATELY)	N/A
27	1	Hospital Identification Label [included with item 28]	08090-000
28	1	Reservoir (Replacement Kit) [includes items 26, 27, 29]	77867-000
29	1	Water Level Label [included with item 28]	04257-001
30	4	Suction Cup	90385-000
31	1	Tubing, 1/4" ID x 3-1/2" long	80030-028
32	1	Circuit Breaker with Clip	90500-000
33	2	Manifold Fitting	03394-000
34	1	Brass Manifold Plate	03881-000
35	1	Switch (120V)	91357-000
36	1	OVER TEMP Lamp with Clip	91282-007

* The well backup limit thermostat is part of the tray assembly.
Do not attempt to drill out the old thermostat. A leakproof installation is not possible.
Install tray assembly (see p. 16).

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Item	Qty	Description	P/N
37	1	Front Label [included with item 17]	08158-000
38	1	Hose Assembly [includes items 41]	08648-000
39	2	Screw, 4-40 x 3/8", SST	91275-027
40	1	Indicator	03975-000
41	2	Click Connect Cou pling [included with item 38]	91367-004
43	1	Strain Relief Bushing	90076-018
44	1	Power Cord with molded plug	08084-000
45	1	Hose Fitting (orificed)	03989-000
46	1	Hose Fitting (no orifice)	03988-000
47	1	Brass Manifold Block	03983-000
48	1	Manifold Gasket	03381-000
49	1	Plug (replacement)	90255-000
50	1	Fibre Washer	90436-000
51	1	Fastener Clip	90085-015
52	1	Potentiometer Shaft	03969-000
53	1	Backup Limit Thermostat (manifold)	77744-000
54	2	Spacer	90462-000
55	1	PC Board Assembly, includes thermistor	77869-000
56	2	Lockwasher, Internal	90139-004
57	2	Screw, 4-40 x 1/4", SST	90018-025
58	1	LOGO Label [Included with item 4]	08634-000
59		Hose Strap [Included with item 4] (NOT AVAILABLE SEPARATELY)	N/A
61	1	Triac, 2N6346A (RCA)	90709-000
62		Heat Sink [Included with item 55] (NOT AVAILABLE SEPARATELY)	N/A
63	1	Potentiometer	90728-018
64	1	Mercury Switch	03971-000
65	1	Resistor, 560 ohm, 1/4W, 5%	90092-043
66	1	Thermistor	06732-001
67	1	Potentiometer	90728-127
68	1	IC CA3059EX	90886-031
69	1	Diode, 1N914	90717-002
70	1	Capacitor, 100 µf, 50V	90701-060
71	1	Resistor, 8.2K ohm, 5W, 5%	90092-440
74	2	Temperature Adjusting Key [NOT SHOWN]	03661-000
---	1	Thermometer [NOT SHOWN, see p. 21]	TFC-1
---	1	Test Cover [NOT SHOWN, see p. 21]	TPC-1
---	1	Flow and Temperature Test Tool [NOT SHOWN, see p. 21]	TPT-9
---	1	Adaptor Hose Assembly [NOT SHOWN, see p. 21]	77926-000

SECTION 16 - ORDERING INFORMATION

The K-MOD 100 heat therapy pump can be ordered using Catalog No. 64N07500. All other accessories can be ordered using catalog numbers listed in Section 3.8 of this manual. Order pump/accessories from your Baxter Healthcare Corporation Distribution Representative or your Baxter Customer Service Representative at 1 800 964-5227.

Specific parts for the K-MOD 100 pump can be ordered from Gaymar Industries, Inc., Customer Service, 1 800 828-7341.

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Distributed by:
Baxter Healthcare Corporation
Deerfield, IL 60015-4633 USA 2/96

Printed in USA
P/N 08845-000 2/96

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